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APPLICATION NO.	FILING DATE	FIRST-NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/700,951	11/21/2000	Mikko Huttunen	274039	4662

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Pillsbury, Winthrop LLP
1600 Tysons Boulevard
McLEAN, VA 22102

EXAMINER	
PERILLA, JASON M	
ART UNIT	**PAPER NUMBER**
2634	7

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Please find below and/or attached an Office communication concerning this application or proceeding.

PTO-90C (Rev. 10/03)

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Office Action Summary	Application No.	Applicant(s)	
	09/700,951	HUTTUNEN, MIKKO	
	Examiner	**Art Unit**	
	Jason M Perilla	2634	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *11 November 2000*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-8* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-8* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☒ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *11 November 2000* is/are: a)☒ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. §§ 119 and 120

12)☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☒ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☒ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

13)☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application) since a specific reference was included in the first sentence of the specification or in an Application Data Sheet. 37 CFR 1.78.

a) ☐ The translation of the foreign language provisional application has been received.

14)☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121 since a specific reference was included in the first sentence of the specification or in an Application Data Sheet. 37 CFR 1.78.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)

2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)

3) ☒ Information Disclosure Statement(s) (PTO-1449) Paper No(s) 3.

4) ☐ Interview Summary (PTO-413) Paper No(s). _____.

5) ☐ Notice of Informal Patent Application (PTO-152)

6) ☐ Other:

DETAILED ACTION

1. Claims 1-8 are pending in the instant application.

Priority

2. Acknowledgment is made of applicant's claim for foreign priority under 35 U.S.C. 119(a)-(d).

Information Disclosure Statement

3. The information disclosure statement (IDS) submitted on November 21, 2000 is in compliance with the provisions of 37 CFR 1.97. Accordingly, the information disclosure statement is being considered by the examiner.

Specification

4. This application does not contain an abstract of the disclosure as required by 37 CFR 1.72(b). An abstract on a separate sheet is required.

Claim Rejections - 35 USC § 103

5. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

6. Claims 1, 3-5, and 7-8 are rejected under 35 U.S.C. 103(a) as being unpatentable over Love et al (5363412 – IDS Paper No. 5; Ref. BR) in view of Birchler et al (5440582).

Regarding claim 1, Love et al discloses a method of detecting an interfering signal in a time division multiple access (TDMA) radio receiver (fig. 2; col. 2, line 22),

characterized by in the method taking samples from symbol sequences of a received signal over a TDMA timeslot (col. 3, lines 10-18), generating by a modulation detector a signal path or signal value corresponding to the TDMA timeslot or a portion thereof (col. 3, lines 50-52), and determining an error estimate representing the erroneousness of the signal path generated (col. 3, lines 50-65). Love et al discloses a typical, almost notoriously known, receiver of a TDMA transmission. The method of the receiver is shown by figure 3. The signal path is determined by the Viterbi decoder (22), and the channel impulse response or error estimate is determined by the channel predictor and channel estimator (26 & 25, respectively). By this method of reception of the TDMA signal, a minimum least squared error or maximum likelihood sequence estimator (MLSE) evaluation is used to make symbol decisions (col. 2, lines 9-17). Although the method described by Love et al discloses the generation of an error estimate (fig. 3, "ERROR SIGNAL"), it does not disclose comparing the error estimate with a predetermined threshold value, and recognizing the reception of the interfering signal if the error estimate is greater than the predetermined threshold value. However, Birchler et al teaches an analogous receiver method of TDMA signals (col. 3, lines 9-22). Birchler et al teaches that by the determination of signal usability, a receiver can appropriately provide feedback to a communications system for channel assignment and communications handoffs (col. 6, lines 30-38). The method taught by Birchler et al comprises making a determination of signal usability (col. 6, lines 19-22), and it is inherent in such a determination that a threshold or test of signal usability is utilized to make the determination. The reception of an interfering signal is analogous to the

reception of a signal that is not usable. Therefore, it would have been obvious to one of ordinary skill in the art at the time which the invention was made to use the signal usability determination as taught by Birchler et al in the TDMA reception method disclosed by Love et al because the determination of signal usability would be advantageous to the system for the allocation of system channels and the determination of channels that are no longer serviceable by the system.

Regarding claim 3, Love et al in view of Birchler et al disclose the limitations of claim 1 as applied above. Further, Love et al disclose a method characterized by using a signal path error metric which is generated by means of quadratic errors which are calculated on the basis of the difference between individual symbol sequence specific sample points and corresponding reference constellation points constructed on the basis of the channel estimate describing the state of the radio channel used as the error estimate representing the erroneousness of the signal path. An adaptive MLSE receiver makes a symbol decision based upon the quadratic errors between the signal path and the estimated channel error signal path (col. 3, lines 46-65). One skilled in the art is familiar with how an MLSE receiver works to make symbol decisions for quaternary phase shift keyed (QPSK) modulated signals. The channel error estimate is composed of a reference constellation of points (col. 3, line 66 – col. 4, line 5). As is understood by one of ordinary skill in the art, the channel error estimate comprises a type of weighted average by using the received complex signal values for tracking and describing the state of the radio channel.

Regarding claim 4, Love et al in view of Birchler et al disclose the limitations of claim 1 as applied above. Further, Love et al disclose a method characterized by generating two or more alternative signal paths (fig. 5, refs. 44, 45; col. 2, lines 10-15) from the received timeslot or a portion thereof by two or more parallel modulation detectors preferably of different types (col. 2, lines 10-15), determining an error estimate of each signal path, and selecting the signal path having the best error estimate to be used in the comparison (col. 5, lines 38-43).

Regarding claim 5, Love et al discloses equipment for detecting an interfering signal in a time division multiple access (TDMA) radio receiver (fig. 2; col. 2, line 22), characterized by taking samples from symbol sequences of a received signal over a TDMA timeslot (col. 3, lines 10-18), generating by a modulation detector a signal path or signal value corresponding to the TDMA timeslot or a portion thereof (col. 3, lines 50-52), and determining an error estimate representing the erroneousness of the signal path generated (col. 3, lines 50-65). Love et al discloses a typical, almost notoriously known, receiver of a TDMA transmission. The equipment of the receiver is shown by figure 3. The signal path is determined by the Viterbi decoder (22), and the channel impulse response or error estimate is determined by the channel predictor and channel estimator (26 & 25, respectively). By this receiver of the TDMA signal, a minimum least squared error or maximum likelihood sequence estimator (MLSE) evaluation is used to make symbol decisions (col. 2, lines 9-17). Although the method described by Love et al discloses the generation of an error estimate (fig. 3, "ERROR SIGNAL"), it does not disclose comparing the error estimate with a predetermined threshold value, and

recognizing the reception of the interfering signal if the error estimate is greater than the predetermined threshold value. However, Birchler et al teaches an analogous receiver system of TDMA signals (col. 3, lines 9-22). Birchler et al teaches that by the determination of signal usability, a receiver can appropriately provide feedback to a communications system for channel assignment and communications handoffs (col. 6, lines 30-38). The system taught by Birchler et al comprises making a determination of signal usability (col. 6, lines 19-22), and it is inherent in such a determination that a threshold or test of signal usability is utilized to make the determination. The reception of an interfering signal is analogous to the reception of a signal that is not usable. Therefore, it would have been obvious to one of ordinary skill in the art at the time which the invention was made to use the signal usability determination as taught by Birchler et al in the TDMA reception method disclosed by Love et al because the determination of signal usability would be advantageous to the system for the allocation of system channels and the determination of channels that are no longer serviceable by the system.

Regarding claim 7, Love et al in view of Birchler et al disclose the limitations of claim 1 as applied above. Further, Love et al disclose equipment characterized by using a signal path error metric which is generated by means of quadratic errors which are calculated on the basis of the difference between individual symbol sequence specific sample points and corresponding reference constellation points constructed on the basis of the channel estimate describing the state of the radio channel used as the error estimate representing the erroneousness of the signal path. An adaptive MLSE

receiver makes a symbol decision based upon the quadratic errors between the signal path and the estimated channel error signal path (col. 3, lines 46-65). One skilled in the art is familiar with how an MLSE receiver works to make symbol decisions for quaternary phase shift keyed (QPSK) modulated signals. The channel error estimate is composed of a reference constellation of points (col. 3, line 66 – col. 4, line 5). As is understood by one of ordinary skill in the art, the channel error estimate comprises a type of weighted average by using the received complex signal values for tracking and describing the state of the radio channel.

Regarding claim 8, Love et al in view of Birchler et al disclose the limitations of claim 1 as applied above. Further, Love et al discloses equipment characterized by generating two or more alternative signal paths (fig. 5, refs. 44, 45; col. 2, lines 10-15) from the received timeslot or a portion thereof by two or more parallel modulation detectors preferably of different types (col. 2, lines 10-15), determining an error estimate of each signal path, and selecting the signal path having the best error estimate to be used in the comparison (col. 5, lines 38-43).

7. Claims 2 and 6 are rejected under 35 U.S.C. 103(a) as being unpatentable over Love et al in view of Birchler et al, and further in view of LaRosa et al (5323421 – IDS Paper No. 5; Ref. AR).

Regarding claim 2, Love et al in view of Birchler et al disclose the limitations of claim 1 as applied above. Love et al in view of Birchler et al do not disclose the method of claim 1 characterized by using in the comparison an error estimate of a signal path corresponding to a half timeslot. However, LaRosa et al teaches a TDMA receiver (col.

1, lines 24-27) method that performs a channel quality estimation or finds the channel error estimate (col. 1, lines 50-55). Further, LaRosa et al teaches that the accuracy of conventional channel error estimates is insufficient because of the limited number of bits within the estimation interval (col. 1, lines 37-47; lines 56-60) and teaches a method wherein the channel estimator uses all bits from entire sub-intervals in the estimate (col. 2, line 65 – col. 3, line 9). LaRosa teaches that by using only the bits of the "sync words", the channel error estimate can be insufficiently accurate (col. 1, lines 50-55). In view of the teachings of LaRosa et al, it is obvious that the best channel error estimate can be acquired by using as many bits as possible from the receiving signal(s) during the error estimation. Therefore, it would have been obvious to one of ordinary skill in the art at the time which the invention was made to utilize as many bits as possible in the receiving signal for the estimation of the channel error as taught by LaRosa et al in the TDMA receiver method of Love et al in view of Birchler et al because the channel error estimate would be as accurate as possible. The applicant's explanation of the use of a "half timeslot" worth of bits in the channel error estimate on page 2, line 22 is made as "for example", and does not imply any particular novelty with the exact number (a half timeslot worth) of bits. It would have been obvious for one of ordinary skill in the art to use more bits from a TDMA frame for the channel error estimate than those only found in the synchronization word. For example, it would be obvious to one of ordinary skill in the art to use any number of bits between only the number of bits in the sync word to the total number of bits in the TDMA frame, including half the bits, as only limited by the cost and complexity of the receiver system.

Regarding claim 6, Love et al in view of Birchler et al disclose the limitations of claim 1 as applied above. Love et al in view of Birchler et al do not disclose the equipment of claim 1 characterized by using in the comparison an error estimate of a signal path corresponding to a half timeslot. However, LaRosa et al teaches a TDMA receiver (col. 1, lines 24-27) method that performs a channel quality estimation or finds the channel error estimate (col. 1, lines 50-55). Further, LaRosa et al teaches that the accuracy of conventional channel error estimates is insufficient because of the limited number of bits within the estimation interval (col. 1, lines 37-47; lines 56-60) and teaches a system wherein the channel estimator uses all bits from entire sub-intervals in the estimate (col. 2, line 65 – col. 3, line 9). LaRosa teaches that by using only the bits of the "sync words", the channel error estimate can be insufficiently accurate (col. 1, lines 50-55). In view of the teachings of LaRosa et al, it is obvious that the best channel error estimate can be acquired by using as many bits as possible from the receiving signal(s) during the error estimation. Therefore, it would have been obvious to one of ordinary skill in the art at the time which the invention was made to utilize as many bits as possible in the receiving signal for the estimation of the channel error as taught by LaRosa et al in the TDMA receiver method of Love et al in view of Birchler et al because the channel error estimate would be as accurate as possible. The applicant's explanation of the use of a "half timeslot" worth of bits in the channel error estimate on page 2, line 22 is made as "for example", and does not imply any particular novelty with the exact number (a half timeslot worth) of bits. It would have been obvious for one of ordinary skill in the art to use more bits from a TDMA frame for the channel error

estimate than those only found in the synchronization word. For example, it would be obvious to one of ordinary skill in the art to use any number of bits between only the number of bits in the sync word to the total number of bits in the TDMA frame, including half the bits, as only limited by the cost and complexity of the receiver system.

Conclusion

8. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure. The following prior art not relied upon above is cited to further show the state of the art with respect to adaptive MLSE receiver systems.

U.S. Pat. No. 6115435 to Harada et al; MLSE receiver that calculates errors by the Euclidian distance between the signal path and the expected signal point.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Jason M Perilla whose telephone number is (703) 305-0374. The examiner can normally be reached on M-F 8-5 EST.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Steven Chin can be reached on (703) 305-4714. The fax phone number for the organization where this application or proceeding is assigned is (703) 872-9314.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is (703) 306-0377.

STEPHEN CHIN
SUPERVISORY PATENT EXAMINER
TECHNOLOGY CENTER 2600

Jason M. Perilla
December 5, 2003

jmp